

struction described above, but embraces such modified forms thereof that come within the scope of the following claims. For example, it is understood that a unitary housing could be used in place of the housing 22 and the housing base 26. It is also understood that different telescoping or telescopically rotating fastening arrangements between the housing 22 and the housing base 26 which do not use the retainer ring 82 and pin 92 arrangement are possible. For example, the housing 22 may simply act as a sleeve and telescopically slide over the housing base 26. Alternatively, internal threading may be included within the rear cylindrical portion 32 of the housing 22 and complimentary exterior threading may be included on the plug portion 62 of the housing base 26. However, the arrangement described previously is preferred because it prevents the housing 22 from possibly detaching or unscrewing from the plug portion 62 of the housing base 26 and falling onto the patient or workpiece.

Additionally, while the optical element 24 is generally contemplated to be a glass or plastic refractive lens, it need not necessarily be such a lens. The optical element 24 could instead be any other type of optical element with positive properties. Examples of such optical elements are binary optic means or a holographic optical element, which function on the basis of diffraction rather than refraction. Another possibility is a gradient index optical element wherein the index of refraction of the element varies linearly or radially about the optical axis to provide the desired optical characteristics.

Further, it is understood that in the claims, means plus function clauses are intended to cover the structures described herein as performing their recited function, and also both structural equivalents and equivalent structures. As an example, though a nail and a screw may not be structural equivalents insofar as a nail employs a cylindrical surface to secure parts together whereas a screw employs a helical surface, in the context of fastening parts, a nail and a screw are equivalent structures.

What is claimed is:

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- 40 1. An illumination assembly comprising:
- a. a light guide having an output end and an input end, the input end being adapted for connection to a remote illumination source;
 - b. a housing having a light guide opening and an illumination opening, the output end of the light guide extending within the housing and being aligned to illuminate the illumination opening;
 - c. an aspheric lens mounted within the illumination opening; and
 - d. attachment means for removably attaching the housing to headgear.
- 45 2. The illumination assembly of claim 1 wherein the light guide comprises a fiberoptic bundle.
- 50 3. The illumination assembly of claim 1 wherein the light guide has a diameter of less than 3 millimeters.
- 55 4. The illumination assembly of claim 1 wherein the housing includes a housing base telescopically engaged to the housing, wherein the output end of the light guide is attached to the housing base to provide an adjustable relationship between the output end and the aspheric lens.
- 60 5. The illumination assembly of claim 4 wherein the housing includes a helical groove therein, and a key riding within the helical groove.
- 65 6. The illumination assembly of claim 1 in combination with eyeglasses, wherein the attachment means is removably attached to the eyeglasses.

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7. The illumination assembly of claim 1 in combination with binocular telescopes, wherein the attachment means is removably attached to the binocular telescopes.
8. The illumination assembly of claim 1 wherein the housing includes an attachment bevel for filter attachment surrounding the illumination opening.
9. The illumination assembly of claim 1 wherein the light guide opening and the illumination opening are both generally circular and are coaxial.
10. The illumination assembly of claim 1 wherein the attachment means comprises a clip pivotally mounted to the housing.
11. The illumination assembly of claim 1 wherein the aspheric lens has a diameter of less than 2 centimeters.
12. An illumination assembly comprising:
- a. a housing having a light guide opening and an opposing illumination opening;
 - b. a housing base adjustably engaged to the housing, the housing base being adapted to support a light guide to illuminate the illumination opening; 15
 - c. a positive lens mounted in the illumination opening, the positive lens including an aspheric face adjacent the housing base and an opposing generally planar face; and 20

- d. attachment means, pivotably attached to the housing base, for removably attaching the housing base to headgear.
- 13. The illumination assembly of claim 12 having a mass of less than 10 grams.
- 14. The illumination assembly of claim 12 having a maximum dimension of less than 2 inches.
- 15. The illumination assembly of claim 12 wherein the lens has a diameter of less than 2 centimeters.
- 16. The illumination assembly of claim 12 in combination with a light guide supported within the housing base.
- 17. The illumination assembly of claim 16 wherein the light guide is a fiberoptic bundle.
- 18. The illumination assembly of claim 12 wherein the housing is telescopically engaged to the housing base.
- 19. The illumination assembly of claim 18 including a key located between and rotatably engaging the housing and housing base.
- 20. The illumination assembly of claim 12 wherein the housing includes an attachment bevel surrounding the illumination opening, the attachment bevel being adapted for attachment of a filter.

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21. An illumination assembly for dental and medical application comprising:

a. a lightweight, flexible light guide having an input end and an output end, the input end being adapted for connection to a remote illumination source;

b. a small, lightweight housing having an input end having an interior surface that defines a light guide opening and an output end having an interior surface that defines an illumination opening, the output end of the lights guide extending within the light guide opening and being aligned so that light therefrom illuminates the illumination opening;

c. only a single lens mounted within the interior surface of the output end of the housing, said lens being an aspheric lens, thereby providing a light source of such weight and size that it may be mounted to headgear so that an illumination beam therefrom substantially corresponds to the user's line of sight; and

d. means for attaching the housing to the headgear.

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22. An illumination assembly for dental and medical applications comprising:

a. a lightweight, flexible fiberoptic bundle including several optical cables and having an input end and an output end, the input end being adapted for connection to a remote illumination source;

b. a small, light weight housing including an input end having an interior surface that defines a light guide opening and an output end having an interior surface that defines an illumination opening, the output end of the fiberoptic bundle extending within the light guide opening and being aligned so that light therefrom illuminates the illumination opening;

c. only a single lens mounted within the interior surface of the output end of the housing, said lens being an aspheric refractive lens, thereby providing a light source of such weight and size that it may be mounted to head gear so that an illumination beam therefrom substantially corresponds to the user's line of sight; and

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d. means for attaching the housing to the headgear.

23. An illumination assembly for dental and medical applications comprising:

a. a lightweight, flexible fiberoptic bundle including several optical cables and having an input end and an output end, the input end being adapted for connection to a remote illumination source;

b. a small, lightweight housing including an input end having an interior surface that defines a light guide opening and an output end having an interior surface that defines an illumination opening, the output end of the fiberoptic bundle extending within the light guide opening and being aligned so that light therefrom illuminates the illumination opening;

c. means mounted within the interior surface of the output end of the housing for focusing the light illuminating the opening for producing a small, bright spot of high and uniform intensity within approximately 12 inches from the housing; thereby providing a light source of such weight and size that it may be mounted to headgear so that an illumination beam therefrom substantially corresponds to the user's line of vision; and

d. means for attaching the housing to the headgear close to the user's eyes and substantially corresponds to the user's line of vision.

24. The illumination assembly of claim 21 wherein the light guide is a fiber optic bundle having a diameter less than about 3 millimeters.

25. The illumination assembly of claim 21 wherein the light guide is a fiber optic bundle having a diameter less than about 2 millimeters.

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26. The illumination assembly of claim 21 wherein the housing includes a housing base telescopically engaged to the housing, wherein the left guide is fiber optic bundle, wherein the output end of the light guide is attached to the housing base, and wherein means are provided for adjusting the distance between the output end and the aspheric lens.

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27. The illumination assembly of claim 25 wherein the housing includes a helical groove therein, and a pin riding within the helical groove.

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~~28. The illumination assembly of claim 21, 22 or 23 in combination with an implement mountable on a users head, wherein the attaching means is removably attachable to the implement.~~

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29. The illumination assembly of claim 28 wherein the implement mountable on the users head is eyeglasses.

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30. The illumination assembly of claim 29 wherein the binocular telescope is mounted on the eyeglasses and the attaching means is removably attached to the binocular telescope as that the housing is substantially coaxial with the line of sight of the telescope.

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31. The illumination assembly of claim 21, 22 or 23 wherein the attachment means comprises a clip for removably attaching the housing to headgear substantially coaxial with the user's line of sight.

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32. The illumination assembly of claim 31 wherein the clip is pivotally mounted to the housing.

~~33.~~ The illumination assembly of claim 21, 22 or 23 wherein the aspheric lens has a diameter of less than 2 centimeters.

~~34.~~ An illumination assembly of claim 21, 22 or 23 wherein said illumination assembly without the light guide and mounting means has a weight of less than about 10 grams.

~~35.~~ The illumination assembly of claim 21, 22 or 23 wherein said lens include an aspheric face and opposing guides plane face, the lens being mounted such that said aspheric face faces upwardly.

~~36.~~ An illumination assembly comprising:
a. a light guide having an output end and an input end, the input end being adapted for connection to a remote illumination source;
b. a housing having a light guide opening and an illumination opening, the output end of the light guide extending within the housing and being aligned illuminate the illumination opening;
c. only a single optical element, the single optical element being a single aspheric lens mounted within the housing; and
d. attachment means for removably attaching the housing to headgear.

~~37.~~ The illumination assembly of claim 36 wherein the light guide comprises one or more fiberoptic cables.

~~38.~~ The illumination assembly of claim 36 wherein the light guide comprises a liquid-filled light guide.

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39. The illumination assembly of claim 36 wherein the light guide has a diameter of about 3 millimeters or less.

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40. The illumination assembly of claim 36 wherein the housing includes a housing base coupled to the housing, wherein the output end of the light guide is coupled to the housing base.

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41. The illumination assembly of claim 40 wherein the output end of the light guide is attached to the housing base to provide an adjustable relationship between the output end and the aspheric lens.

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42. The illumination assembly of claim 40 wherein the housing includes a housing base telescopically engaged to the housing.

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43. The illumination assembly of claim 40 wherein the housing includes a helical groove therein, and a pin riding within the helical groove.

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44. The illumination assembly of claim 36 in combination with an implement mounted on a users head, wherein the attachment means is removably attached to the implement mounted on a users head.

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45. The illumination assembly of claim 44 wherein the implement mounted on the users head is eyeglasses.

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46. The illumination assembly of claim 45 wherein the implement mounted on the users head is a binocular telescope.

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47. The illumination assembly of claim 36 wherein the housing includes an exterior attachment bevel for filter attachment surrounding the illumination opening.

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48. The illumination assembly of claim 36 wherein the housing includes an interior attachment bevel.

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49. The illumination assembly of claim 36 wherein the light guide opening and the illumination opening are both generally circular and are coaxial.

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50. The illumination assembly of claim 36 wherein the attachment means comprises a clip for removably attaching the housing to headgear.

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51. The illumination assembly of claim 36 wherein the attachment means comprises a bracket for removably attaching the housing to headgear.

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52. The illumination assembly of claim 50 wherein the clip is pivotally mounted to the housing.

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53. The illumination assembly of claim 36 wherein the aspheric lens has a diameter of less than 2 centimeters.

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